

Department of the Interior
U.S. Geological Survey

CONTROL AND SCHEDULE INTERFACE SYSTEM (CSIS) OPERATIONS CONCEPT

CSIS 1.3.0

Version 3.0

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Executive Summary

This document describes satellite data acquisition and processing operations using an automation system at the U.S. Geological Survey (USGS) Center for Earth Resources Observation and Science (EROS) Data Capture and Processing Facility (DCPF). This includes operational scenarios, interfaces, scheduling, operations procedure development, and maintenance/support activities for the automation system.

Document History

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Contents

Executive Summary	ii
Document History	iii
Contents.....	iv
List of Figures	v
Section 1 Introduction.....	1
1.1 Background.....	1
1.2 Purpose and Scope	1
Section 2 System Description	2
2.1 Current Operations	2
2.2 Overview of Functional Requirements	3
2.2.1 Platform	3
2.2.2 Network.....	3
2.2.3 Schedule and Ephemeris Ingest.....	3
2.2.4 Schedule Dissemination	4
2.2.5 Ephemeris Processing.....	4
References.....	5

List of Figures

Figure 2-1. CSIS Data Flow Diagram	3
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Section 1 Introduction

1.1 Background

The Data Capture and Processing Facility (DCPF) requires an automated contact schedule and ephemeris reformatting and distribution system. Currently, the DCPF receives contact schedules and ephemeris from the Landsat 5 (L5) and the Landsat 7 (L7) Mission Operations Centers (MOCs), with the potential for the addition of other MOCs. DCPF uses the contact schedules to schedule events on the 10-meter Ground Station Controller (GSC), 5.4-meter Station Control Computer (SCC) and Tracking Data Formatter (TDF). These machines have different criteria for schedule and ephemeris format. In addition, the MOCs may provide the contact schedules in slightly different formats.

1.2 Purpose and Scope

The purpose of this operations concept is to define a centralized system capable of ingesting contact schedules and ephemeris from multiple locations (MOCs) in various formats and reformatting them as required for distribution to the appropriate destinations.

Section 2 System Description

2.1 Current Operations

Currently, the Landsat 7 MOC initiates a File Transfer Protocol (FTP) push to electronically transfer a contact schedule and updated ephemeris to the DCPF. Due to NASA Closed IONet security requirements, data transfers are required to be initiated from Closed IONet systems only. The contact schedule and updated ephemeris from the Landsat 5 MOC are electronically transferred via an FTP pull initiated by the CSIS. The contact schedule and ephemeris are transferred to the input directory on the Control and Schedule Interface System (CSIS) to schedule pass events. As part of the pass event routine, the CSIS schedules the contact on the SCC, GSC and the TDF.

Because each MOC has a different contact schedule format, a centralized system is required to ingest a contact schedule from a MOC, alter its format based on the requirements of the various destinations, and deliver it to the TDF, SCC and GSC as shown in Figure 2-1.

A centralized system is required to ingest ephemeris from a MOC and pass the data to the GSC and SCC. Upon receipt, this system will rename Landsat 5 North American Air Defense (NORAD) Two Line Element (TLE) files send them directly to the SCC and GSC. When using the 10-meter antenna, the system will parse the Landsat 7 Improved Inter-Range Vector (IIRV) files and send them to the GSC prior to each individual event. When using the 5.4-meter antenna, the full IIRV files will be sent upon ingest and parsed by the SCC. Desirably, this system will be entirely automated and function with little to no operator intervention.

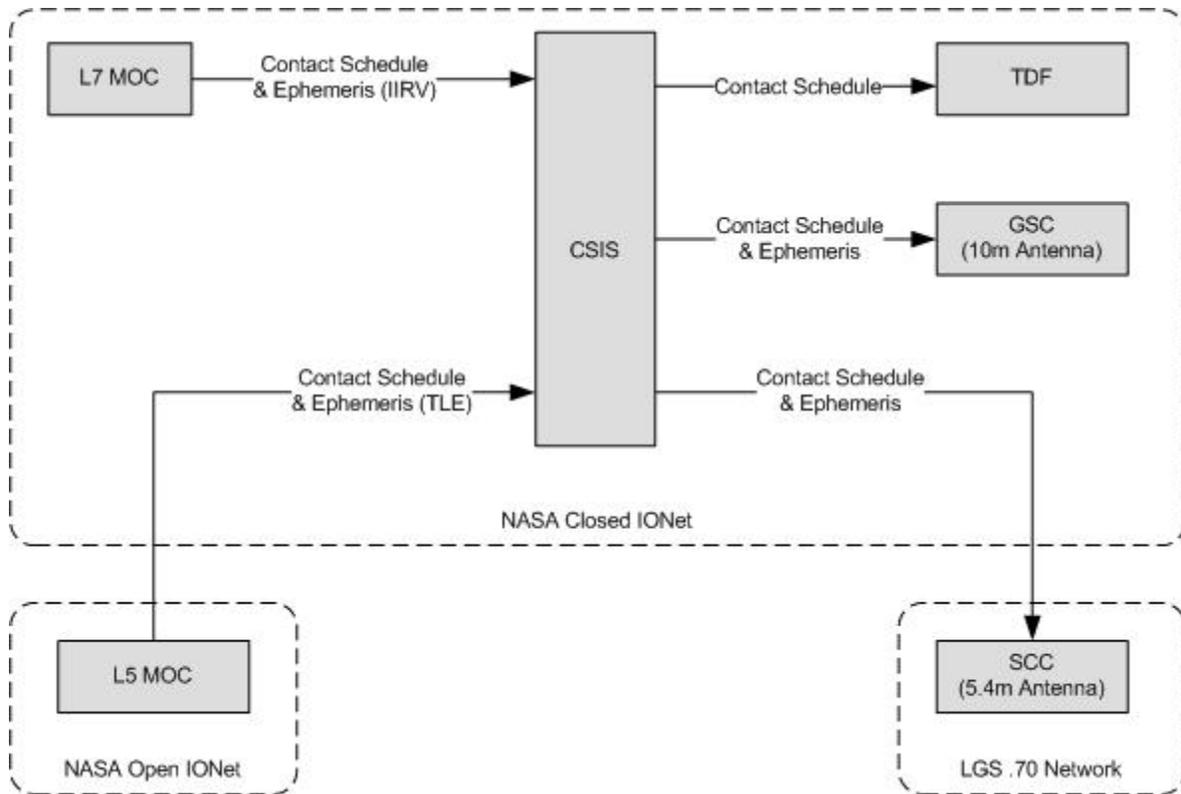


Figure 2-1. CSIS Data Flow Diagram

2.2 Overview of Functional Requirements

2.2.1 Platform

The CSIS shall reside on a Personal Computer (PC) running RedHat Enterprise WS Version 2.4.x or later.

2.2.2 Network

The CSIS shall reside on the closed network (i.e., the closed IONet).

2.2.3 Schedule and Ephemeris Ingest

The CSIS shall be capable of polling various external FTP servers for new contact schedules and ephemeris and FTP pull them when available.

Polling shall occur at a configurable amount of time.

The CSIS shall be capable of receiving a contact schedule and ephemeris FTP pushed from various locations and shall ingest and distribute it within a configurable amount of time of receipt.

The CSIS shall be capable of staging contact schedules and ephemeris for retrieval by a destination system.

The CSIS shall be capable of FTP pushing a reformatted contact schedule and ephemeris to a destination system (based upon a user-defined internal list of targets and corresponding Internet Protocol (IP) addresses).

Schedule and ephemeris ingest formats are described in detail in the ICD between the CSIS and External Systems.

2.2.4 Schedule Dissemination

The CSIS will disseminate the contact schedules to the GSC and TDF upon reformat and to the SCC prior to formatting. The CSIS also will maintain a copy of the schedule locally for use in Improved Inter-Range Vector Ephemeris processing. Schedule formatting for dissemination is described in detail in the ICD between the CSIS and External Systems.

2.2.5 Ephemeris Processing

The CSIS will receive two different types of ephemeris: NORAD TLE, and IIRV. The system will treat each type independently. The IIRV ephemeris files will be received at various times throughout the day and may be updated at short notice. The TLE ephemeris files will typically be updated once a day, but may be updated more frequently. Ephemeris formatting for dissemination is described in detail in the ICD between the CSIS and External Systems.

2.2.5.1 TLE Ephemeris Processing

The TLE files will be retrieved, formatted, named according to the CSIS to External Systems ICD, and sent directly to the GSC or SCC upon receipt.

2.2.5.2 IIRV Ephemeris Processing

The CSIS will utilize contact schedules to determine IIRV processing intervals. When the CSIS identifies an upcoming support utilizing IIRV ephemeris, the CSIS will retrieve the IIRV file, parse the file if required, rename it according to the CSIS to External Systems ICD, and send it to the antenna controller. When sending IIRV ephemeris to the 5.4-meter antenna controller, the IIRV files are left intact for the SCC to parse into the appropriate time blocks. When sending to the 10-meter GSC antenna controller, the IIRV files are parsed by the CSIS before they are sent.

References

Please see <http://landsat.usgs.gov/resources/acronyms.php> for a list of acronyms.

USGS/EROS. LS-ICD-02. Interface Control Document (ICD) Between the Landsat 7 (L7) Mission Operations Center (MOC) and the Landsat Ground Segment. Version 5.0. March 2009.

USGS/EROS. LS-ICD-38. Interface Control Document (ICD) Between the Landsat 5 Mission Operations Center (MOC) and the Landsat Ground Segment. Version 3.0. July 2006.

USGS/EROS LS-ICD-TBD Interface Control Document (ICD) Between the Contact Schedule Interface System (CSIS) and External Systems. Version 1.0. June 2009